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ABSTRACT

This study investigates the development of two levels of morphological knowledge that contribute to Spanish-English bilingual students' ability to recognize cognates: the ability to recognize a cognate stem within a suffixed English word, and knowledge of systematic relationships between Spanish and English suffixes (e.g., the fact that English words ending in "-ty" often have a Spanish cognate ending in "-dad". A total of 196 Latino bilingual students in fourth, sixth, and eighth grades, were asked to give the Spanish equivalent for English words, some of which had derivational and inflectional suffixes. Results indicate that students' ability to translate cognates increases with age above and beyond any increase in their vocabulary knowledge in Spanish and English. There was also marked growth in students' knowledge of systematic relationships between Spanish and English suffixes. Students recognized cognate stems of suffixed words more easily than non-cognate stems, suggesting that in closely-related languages such as Spanish and English, cross-language transfer may play a role not just in recognizing individual words but also in the learning of derivational morphology. (Author)

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Technical Report No. 567

BILINGUAL STUDENTS' DEVELOPING UNDERSTANDING OF MORPHOLOGICALLY COMPLEX COGNATES

Barbara Hancin-Bhatt
William Nagy
University of Illinois at Urbana-Champaign

February 1993

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TECHNICAL REPORTS

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Abstract

This study investigates the development of two levels of morphological knowledge that contribute to Spanish-English bilingual students' ability to recognize cognates: the ability to recognize a cognate stem within a suffixed English word, and knowledge of systematic relationships between Spanish and English suffixes (e.g., the fact that words ending in *-ty* in English often have a Spanish cognate ending in *-dad*). A total of 196 Latino bilingual students in fourth, sixth, and eighth grade were asked to give the Spanish equivalent for English words, some of which had derivational and inflectional suffixes. Results indicate that students' ability to translate cognates increases with age above and beyond any increase in their vocabulary knowledge in Spanish and English. There was also marked growth in students' knowledge of systematic relationships between Spanish and English suffixes. Students recognized cognate stems of suffixed words more easily than noncognate stems, suggesting that in closely related languages such as Spanish and English, cross-language transfer may play a role not just in recognizing individual words but also in the learning of derivational morphology.

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BILINGUAL STUDENTS' DEVELOPING UNDERSTANDING OF MORPHOLOGICALLY COMPLEX COGNATES

The importance of vocabulary knowledge in first-language reading has been thoroughly documented (see Anderson & Freebody, 1981). Research on limited-English proficient students in the U.S. has likewise demonstrated that lack of adequate English vocabulary is a major obstacle to reading comprehension and hence to success in school (García, 1988, 1991; Saville-Troike, 1984). Through its effect on reading comprehension, lack of vocabulary knowledge can lead to a "poor-get-poorer" cycle (Stanovich, 1986), which leaves less able readers increasingly farther behind their peers. In fact, a study from the National Assessment of Educational Progress (Applebee, Langer, & Mullis, 1987) reported that differences between Latino and non-Latino white students' reading performance lie primarily in the areas of vocabulary and conceptual knowledge, that these differences begin to widen at around fourth grade, and that they do not diminish even when the students are in college. These findings are cause for serious concern because Latino bilinguals constitute the single largest--and fastest growing--segment of the limited English proficiency/bilingual student population. Increasing English vocabulary knowledge is essential for ensuring the academic success of these students.

It has been established that students can transfer knowledge gained in their first language to a second language (Gass & Selinker, 1983; Kellerman & Sharwood Smith, 1987). At issue is what types of knowledge can be transferred, and under what conditions. Durgunoğlu and Hancin (1992) discuss what types of reading knowledge can be transferred and under what conditions. In recent studies, transfer has been demonstrated for phonemic awareness (Durgunoğlu, Nagy, & Hancin, 1991) and for orthographic processing (Koda, 1988). In the present study, we investigate the extent to which fourth-, sixth-, and eighth-grade Latino students exploit lexical and morphological similarities between Spanish and English during English word recognition.

English and Spanish share important structural similarities in the lexicon and in morphology that potentially provide Latino bilingual students with significant help in English vocabulary growth and reading comprehension. Academic English is filled with Spanish-English cognates, that is, words that have similar or even identical spellings and meanings in the two languages (e.g., *family* and *familia*, *animal* and *animal*, *insect* and *insecto*). Often, words that are infrequent in English (e.g., *infirm*) have cognates that are everyday words in Spanish (e.g., *enfermo*). There are also systematic relationships between derivational suffixes in English and Spanish. For example, many English words ending in *-ty* (e.g., *felicity*) have Spanish cognates ending in *-dad* (e.g., *felicidad*). There are similar parallels between inflectional suffixes in the two languages.

Cognate Awareness

Recent studies have investigated the role of cognates in second-language reading. From interviews with Latino bilingual fifth- and sixth-grade students about their performance on items from standardized English reading comprehension tests, García (1988, 1991) found that some students were failing to make use of obvious cognate relationships; they did not seem to know the meanings of English words that were orthographically and semantically identical to familiar Spanish words. On the other hand, Jiménez, García, and Pearson (1991) report that sixth- and seventh-grade Latino bilinguals who were proficient readers in English made frequent and effective use of their knowledge of Spanish, including knowledge of cognates, despite the fact that they had not received any instruction in Spanish since the end of third grade.

Nagy, García, Durgunoğlu, & Hancin (in press) also looked at Latino students' use of cognates in reading English. The students read passages in English, then answered multiple-choice comprehension questions about sentences containing targeted cognates. Knowledge of Spanish and English vocabulary

was measured by a separate task. Finally, students were asked questions about their awareness of cognates and whether cognates helped them understand English. They were also asked to circle all the cognates they recognized in the texts they had read. The majority of students showed some awareness of cognate relationships, but this awareness was limited. For example, when asked to circle the cognates in a text, these students circled only half of the cognates in the text that they had previously reported as knowing in both Spanish and English.

Results indicated that awareness of cognate relationships played an important role in the transfer of knowledge to second-language reading. Awareness of cognate relationships was significantly correlated with comprehension of sentences containing the cognates, even when knowledge of the words in Spanish and in English was controlled for statistically.

Studies on vocabulary recognition in adult second-language learners also indicate consistent reliance on the first language in understanding difficult words. Ard and Homburg (1983) tested Spanish- and Arabic-speaking adults on their ability to recognize Spanish-English cognates in a multiple-choice task. Their results indicated that the Spanish speakers did significantly better than the Arabic speakers, a finding they attribute to the orthographic and/or lexical similarities between Spanish and English.

In short, these studies suggest that second-language learners from fourth grade to college utilize cognates when reading English. However, these studies fail to discuss the extent to which these different levels of learners utilize cognates. As noted, García (1988) found variability across her subjects when recognizing cognates. Nagy et al. (in press) found that their subjects utilized cognates in reading English, but there was much variability in their usage, and few students came close to utilizing all the possible cognates in the text. In this study, we were interested in comparing the cognate recognition abilities of students of different grade levels to see if a developmental trend emerged. Such a developmental trend has not yet been documented. However, one could be expected on the basis of the proposed maturational changes between pre-adolescent and adult cognitive strategies (Inhelder & Piaget, 1958), which, in the realm of language use, allow a greater level of metalinguistic awareness and sensitivity to linguistic structure (Vygotsky, 1962).

Morphological Awareness

Research with monolinguals suggests that the ability to analyze the morphological structure of words contributes to word recognition and word learning. Although there is not a simple relationship between morphological complexity and word recognition (Randall, 1985, 1988), a variety of evidence shows that morphological structure plays a role in lexical access (Feldman, 1991; Taft, 1988). The ability to analyze the morphological structure of words also plays an important role in interpreting and learning new words. Anglin (in press) found that much of the massive vocabulary growth that occurs during children's school years can be attributed to their increasing ability to recognize morphological relationships among words (see also Nagy & Anderson, 1984).

Because readers use morphological analysis to help them understand words in their first language, it is reasonable to examine whether this strategy will be transferred when understanding words in the second language. Not only will morphological analysis allow a Latino student to recognize cognates such as *reality* and *realidad*, but transfer of Latin suffix rules from Spanish to English may facilitate recognition of morphologically complex words that do not have a cognate stem. Though there are not many studies available on second-language learners' ability to recognize morphological parts, two studies do suggest that this transfer occurs.

Adjemian (1983) presented linguistic and experimental evidence that lexical rules from the first language, such as the rules that govern word formation processes, constrain the hypotheses the learner makes about the lexical rules of the second language. If two languages have a high degree of structural

similarity, these constraints work in favor of the learner, allowing positive transfer that facilitates comprehension and learning (Gass & Selinker, 1983; Kellerman, 1986; Ringbom, 1986; Sajavaara, 1986). In a study of adult English-as-a-second- language learners' knowledge of derivational morphology, Hahn (1983) concluded that transfer of suffixation rules occurs across structurally related languages.

In a pilot study based on Hahn (1983), we compared the performance of adult Korean speakers and Spanish speakers on tasks involving morphologically complex words in English. Whereas Spanish and English share many cognates and have relatively weak morphological systems, Korean and English do not share many cognates, and Korean has a rich morphological system. In one task, these beginning bilinguals filled in missing letters in either a stem or suffix of morphologically complex words. In another task, they circled complex words that were highly infrequent or made up, judging whether the word was well-formed in English. The results of the morpheme-completion task indicated that Spanish speakers, but not Korean speakers, completed cognate stems more accurately than noncognate stems. Likewise, Spanish speakers were more accurate in completing cognate than noncognate suffixes, whereas Korean speakers were more accurate on noncognate suffixes. On the word-judgment task, the difference between cognate and noncognate circling performance was smaller in the Korean group than in the Spanish group. In general, then, these studies suggest that Spanish-speakers do rely on the similarities between Spanish and English in identifying morphologically complex words.

Although older learners appear to exploit morphological analysis as a strategy and to recognize systematic relationships between suffixes in the two languages, the data reported by Nagy et al. (1992) suggest that upper elementary bilingual students rely primarily on simple orthographic overlap in recognizing cognates and not on systematic relationships among suffixes. In the study we report here, we set out to investigate the development of Latino bilinguals' knowledge of morphology between fourth and eighth grade, and their use of morphological knowledge in cognate recognition.

In looking at students' knowledge about and use of morphology, several distinctions must be made. Because we were interested in suffixes, we distinguished inflectional suffixes, and in particular the verb endings *-ed* and *-ing* in English, from derivational suffixes such as *-ty*, *-ify*, and *-ly*. The reason for this distinction is that previous morphology studies in both first- and second-language learning suggest that derivational and inflectional suffixes constitute different linguistic subsystems, which are learned at different rates. Whereas inflectional suffixes are generally more systematic and do not change the grammatical class of the word, derivational suffixes show more variability (especially in English) and mark a change in the grammatical class of the stem, suggesting a greater semantic shift between a stem and its derived form than a stem and its inflected form.

We also distinguished between two levels of morphological knowledge. The first is the recognition of stem morphemes within morphologically complex words--for example, seeing the *quick* in *quickly* or the *confine* in *confinement*. We consider this a basic level of morphological awareness. The second type of morphological knowledge defined is recognition of systematic relationships between suffixes in English and Spanish, the ability to recognize that Spanish *-dad* and *-ando* can be regularly translated as the English *-ty* and *-ing*, respectively.

Method

Subjects

Subjects were 196 Latino bilinguals from three urban schools in predominantly Spanish-speaking neighborhoods in a large midwestern city. Ninety-six were fourth graders, 41 were sixth graders, and 59 were eighth graders. All subjects were taken from 10 bilingual classrooms. Forty-nine percent of the students were male, 51% female. Forty-nine percent of the students were born in the mainland

United States. Of the 95 students not born in the U.S., 70 were born in Mexico, 22 in Puerto Rico, and 3 in Guatemala.

Teachers were asked to fill out a questionnaire on the classroom experiences of the students, which included questions on language use during reading and discussions, and on the extent to which they encouraged students to attend to cognates when reading English. Most of the teachers reported teaching/speaking 50% of the time in Spanish and 50% in English. Two of the 10 teachers reported greater use of Spanish (approximately 60-70% of the time), while 1 reported speaking mostly in English. Most of the teachers reported that time was spent reading both Spanish and English texts during class (others did not report specifically on reading).

Eight of the 10 teachers reported that their students recognize cognates or parallels between Spanish and English without being told. One teacher reported that some of the children did and some did not. One teacher reported that her children did not recognize parallels between Spanish and English, though this may be related to the fact that this was the classroom where English was the predominantly spoken language. All teachers said they encouraged their students to look for cognates or parallels between Spanish and English, though the frequency with which they did this varied between several times during a class period to once every other day. Finally, all of the teachers reported having taught students about some suffixes in English, and 8 of the 10 said they had discussed suffixes in Spanish also.

Subjects were also asked to complete a questionnaire on language background, prior educational experience, reading abilities in Spanish and English, and preferences concerning speaking Spanish and English in different contexts. A summary of their responses is given in Table 1. Ninety-nine percent of the students reported being able to read in Spanish. Likewise, 99% reported that their parents spoke Spanish. Thirty-nine percent said they could read better in Spanish than English; 10% reported reading better in English than Spanish, and 52% said they could read equally well in both languages.

[Insert Table 1 about here.]

Materials

Three tasks were used to assess students' knowledge of Spanish vocabulary, English vocabulary, and relationships between words in the two languages.

Translation task. In the translation task, students were given English words in a brief context and asked to provide the best Spanish translation for the underlined words. The stimulus words included both cognates and noncognates. The cognates were low-frequency pairs consisting of English stems and associated derivatives such as *facile/facility* or stems and inflected forms such as *converse/conversing* that have systematic relationships with frequent or moderately frequent Spanish words such as *facilidad* or *conversando*. The noncognate words were moderate- to high- frequency stems and their derived or inflected forms, for example *short/shortly* and *dream/dreaming*. The translation task also included general vocabulary items, like *help* and *tiger*, to make the task seem easier. A list of the stimulus words used in the translation task is given in Table 2. The instructions for this task and some sample items are given in Appendix A.

[Insert Table 2 about here.]

After the translation task, students completed a Spanish yes/no vocabulary test so that we could assess their knowledge of the Spanish cognates of the English words in the translation task. In the yes/no vocabulary test, students were asked to indicate whether or not they knew the meanings of a number of words, in this case, by circling *sí* or *no*. Nonword foils were included to control for guessing

(Anderson & Freebody, 1981). A sample of the items used in this task, as well as the instructions for the task, are given in Appendix B.

Matching task. A matching task was also used to assess students' knowledge of relationships between suffixes in Spanish and English. The stimuli consisted of low-frequency English cognates, such as *modify* and *novelty*, and their Spanish counterpart. Students were given the English word first and then asked to choose its translation among four derivationally related Spanish words. The only difference among the choices in Spanish was in their derivational suffixes; to answer the item correctly, the student needed to attend to the relationships between English and Spanish derivational morphology. The instructions for this task and sample items are given in Appendix C.

Two versions of the test were constructed, differing only in the order of the items.

Scoring of the translation task. To extract as much information as possible from students' responses in the translation task, three variables were derived, using three different scoring criteria. In the lenient scoring criterion, a translation was counted as correct if the meaning of the stem was accurately conveyed, regardless of whether the part of speech was correct. For example, for lenient scoring, the word *dangerously* was scored as correct whether the student wrote in *peligroso* or *peligrosamente*. Items for which no translation was given were counted as incorrect.

For the strict scoring criterion, a translation was counted as correct only if both stem meaning and part of speech (reflecting the contribution of the suffix, if one was present) were accurately represented. That is, for the English word *conversing, conversando* would be counted as correct according to the strict criterion, but not *conversaron*.

A third variable, suffix syntax, was scored slightly differently. A translation was counted as correct with respect to suffix syntax if the information in the derivational or inflectional suffix was correctly translated. This variable differs from the strict scoring in three respects: First, an item could be counted correct if the suffix were correctly translated and not the stem (for example, translating *conversing* as *convertiendo* instead of as *conversando*). Second, in computing the proportion correct for suffix syntax, items for which no translation was attempted were not taken into account. That is, suffix syntax was defined as the proportion of attempted translations in which the information in the derivational or inflectional suffix was correctly represented. Third, this variable was only defined for words that had inflectional or derivational suffixes.

The use of the lenient and strict scoring systems follows Freyd and Baron (1982) and Wysocki and Jenkins (1987), who found that monolingual students asked to define suffixed words often gave the meaning of the stem alone, not representing the meaning of the suffix in their definitions. Comparison of the two scoring systems allows us to distinguish between two levels of knowledge of derivatives--recognition of the stem and understanding of the contribution of the suffix.

The third scoring criterion is an attempt to further distinguish between knowledge of stems and knowledge of suffixes. Although the strict scoring system reflects knowledge of suffix meanings, it is also dependent on stem knowledge; a student might get an item wrong according to the strict criterion if he or she did not know that particular stem. The variable suffix syntax, because it is computed using only items for which a translation was attempted, is intended to be less dependent on knowledge of particular stems, and hence more analogous to the matching task.

Design

For the lenient and strict scoring criteria, a 2 x 2 x 2 x 3 mixed analysis of variance was used. Taking the subject as the unit of analysis, Cognate Status (cognate vs. noncognate), Suffixation (stem vs. suffixed

word), and Morphological Process Type (inflectional vs. derivational) were within-subject variables. Grade (4th, 6th, and 8th) was a between-subjects variable. A parallel analysis was performed using the item as the unit of analysis. In this case, Suffixation and Grade were within-item variables, and Cognate Status and Morphological Process Type were between-items variables.

Looking at suffix syntax, we only considered data for the words that had inflectional or derivational suffixes, thus using a 2 x 2 x 3 mixed analysis of variance. Taking the subject as the unit of analysis, Cognate Status and Morphological Process Type were within-subject variables. Grade was a between-subjects variable. A parallel analysis was performed using the item as the unit of analysis. In this analysis, Grade was a within-item variable; Cognate Status and Morphological Process Type were between-items variables.

We will consider only those effects which were significant ($p < .05$) for both subjects and items.

Procedures

All tasks were administered to students in intact classrooms. A background questionnaire was administered first, followed by the translation task, the matching task, and the yes/no vocabulary test. Before each task, instructions were read aloud to students, and example items were presented.

Results

Translation Task

Lenient scoring criterion. Means from the translation for the lenient scoring criterion are given in Table 3. Results from the analysis of variance are as follows:

[Insert Table 3 about here.]

The main effect of grade was significant for subjects, $F(2,191) = 42.7, p < .001$, and for items, $F(2,56) = 129.8, p < .001$. Older students translated more words correctly.

The main effect of cognate status was significant for subjects, $F(1,191) = 97.7, p < .001$, and for items, $F(1,28) = 10.6, p < .01$. Overall, students translated cognates better than noncognates. There was also a Grade x Cognate Status interaction significant for both subjects, $F(2,191) = 28.1, p < .001$, and for items, $F(2,56) = 53.8, p < .001$. Scores for cognates increased more rapidly across grades than did scores for noncognates.

The main effect of Suffixation was significant for both subjects, $F(1,191) = 115.1, p < .001$, and for items, $F(1,28) = 14.3, p = .001$. Suffixed words were less likely to be translated correctly than their stems.

There was a significant Morphological Process Type x Suffixation interaction for both subjects, $F(1,191) = 71.2, p < .001$, and for items, $F(1,28) = 8.2, p < .01$. The difference between the stem and suffixed version of a word was greater for derivational pairs than for inflectional pairs.

There was a significant Cognate Status x Suffixation interaction for subjects, $F(1,191) = 80.2, p < .001$, and for items, $F(1,28) = 7.4, p < .05$. The difference between stems and suffixed words was greater for noncognates than for cognates. There was also a three way Grade x Cognate Status x Suffixation interaction for subjects, $F(2,191) = 3.9, p < .05$, and for items, $F(2,56) = 3.6, p < .05$. This interaction reflects the fact that the difference between cognate stems and suffixed words was extremely small in

all grades; the difference between noncognate stems and suffixed words was larger, but decreased somewhat in eighth grade.

The three-way interaction Morphological Process Type x Cognate Status x Suffixation was significant for subjects, $F(1,191) = 42.7, p < .001$, but not for items, $F(1,28) = 3.5, .05 < p < .1$. This interaction reflects the fact that the difference between stems and suffixed words was larger for noncognate derivational item pairs and relatively small for cognate derivational pairs and for both cognate and noncognate inflectional pairs.

Strict scoring criterion. The mean scores from the Translation Task using the strict scoring criterion are given in Table 4. The results from the analysis of variance are, with only a few exceptions, identical to those for the lenient scoring criterion.

[Insert Table 4 about here.]

The main effect of grade was significant for subjects, $F(2,191) = 24.6, p < .001$, and for items, $F(2,56) = 126.0, p < .001$. Older students translated more words correctly.

The main effect of cognate status was significant for subjects, $F(1,191) = 48.6, p < .001$, and for items, $F(1,28) = 4.5, p < .05$. Overall, students translated cognates better than noncognates. There was also a Grade x Cognate Status interaction significant for both subjects, $F(2,191) = 33.8, p < .001$, and for items, $F(2,56) = 46.1, p < .001$. Scores for cognates increased more rapidly across grades than did scores for noncognates.

The main effect of Suffixation was significant for both subjects, $F(1,191) = 442.1, p < .001$, and for items, $F(1,28) = 47.9, p = .001$. Suffixed words were less likely to be translated correctly than their stems. Contrary to the finding for lenient scoring, the Suffixation x Grade interaction was significant for subjects, $F(1,2,191) = 4.5, p < .05$, and for items, $F(2,56) = 7.2, p < .01$.

The main effect of Morphological Process Type was significant for subjects, $F(1,191) = 34.1, p < .001$, but not for items, $F < 1.0$. Contrary to the findings for lenient scoring, the interaction of Morphological Process Type x Grade was significant for subjects, $F(2,191) = 7.1, p = .001$, and items, $F(2,56) = 3.4, p < .05$.

The Morphological Process Type x Cognate Status interaction was significant for subjects, $F(1,191) = 29.2, p < .001$, but not for items, $F(1,28) < 1.0$.

There was a significant Morphological Process Type x Suffixation interaction for both subjects, $F(1,191) = 140.4, p < .001$, and for items, $F(1,28) = 10.6, p < .01$. The difference between the stem and suffixed version of a word was greater for derivational pairs than for inflectional pairs.

Contrary to the findings for lenient scoring, there was not a significant Cognate Status x Suffixation interaction for subjects, $F(1,191) = 2.7, p > .1$, or for items, $F(1,28) < 1.0$. However, as was the case with the lenient scoring, there was a three-way Grade x Cognate Status x Suffixation interaction significant for subjects, $F(2,191) = 9.7, p < .001$, and for items, $F(2,56) = 12.9, p < .001$.

The three-way interaction Morphological Process Type x Cognate Status x Suffixation was significant for subjects, $F(1,191) = 38.9, p < .001$, but not for items, $F(1,28) = 3.3, .05 < p < .1.0$.

Suffix syntax. Means for the suffix syntax scoring criterion are given in Table 5. Suffix syntax scores were computed only for inflected and derived words, and not for their stems.

[Insert Table 5 about here.]

Analyses of variance showed a main effect of grade significant for both subject, $F(2,130) = 3.2, p < .05$, and for items, $F(2,56) = 94.4, p < .001$. Older subjects represented suffix meaning more accurately.

The effect of Morphological Process Type was significant for subjects, $F(1,130) = 21.5, p < .001$, but not for items, $F(1,28) = 4.1, p = .052$. Students were somewhat better at representing the meanings of inflectional suffixes than the meanings of derivational suffixes.

The effect of Cognate Status was significant for subjects, $F(1,130) = 6.2, p < .05$, but not for items, $F(1,28) = 2.9, p < .1$.

The Grade x Morphological Process Type interaction was significant both for subjects, $F(2,130) = 4.2$, $p < .05$, and for items, $F(2,56) = 3.5, p < .05$. The difference between inflectional and derivational suffixes decreases with grade.

Spanish Vocabulary

Means for reported knowledge of Spanish words--the cognates of those words in the translation task which had cognates--are given in Table 6.

[Insert Table 6 about here.]

Analyses of variance revealed a main effect of grade, significant for both subjects, $F(2,196) = 35.9, p < .001$, and for items, $F(2,28) = 19.7, p < .01$. Older students reported knowing a higher percentage of the words.

The main effect of Morphological Process Type (derivational vs. inflectional) was significant for subjects, $F(1,196) = 8.6, p < .01$, but not for items, $F(1,14) < 1.0$.

Likewise, the main effect of Suffixation was significant for subjects, $F(1,196) = 55.2, p < .001$, but not for items, $F(1,14) = 4.1, .05 < p < .1$. Thus, stems were slightly, but not significantly, more likely to be reported as known than inflected or suffixed forms.

Matching Task

The mean for fourth graders was .20 ($SD = .17$), for sixth graders, .34 ($SD = .19$), and for eighth graders, .38 ($SD = .20$). (These means are corrected for guessing using the standard formula for multiple-choice items with four choices--the number right minus one third the number wrong.) One-way analysis of variance reveals a significant effect of grade.

The matching task is most analogous to the cognate derivatives, when scored according to the suffix syntax criterion. In both cases, the question is whether, given a stem, the student knows which Spanish suffix corresponds to a given English suffix. Because the sets of English cognate derivatives used in two tasks overlap only partially, the two tasks are not strictly comparable. Nevertheless, means for the two tasks (comparing the means for the matching task with those for Cognate Derivatives given in Table 5) are quite similar.

Discussion

Because we solicited subjects from actual bilingual classrooms in their natural (formal) education environment, we realize we cannot control for every variable that may affect these students'

performance. We also realize that the experience of an eighth grader in a bilingual classroom may be quite different from that of a fourth grader in such a classroom. In fact, the majority of our sixth and eighth graders were born abroad (67% and 69%, respectively), while the majority of the fourth graders (68%) were born in the U.S. Differences in the composition of the bilingual student population at different grade levels places some limitations on our ability to draw conclusions about developmental trends. Nevertheless, information from the questionnaire we administered to students also allows us to determine the relationship between some demographic factors and performance on the experimental tasks.

In this study, we are concerned with Latino bilingual children's ability to recognize cognates and to use their knowledge of morphology to help them recognize low-frequency English cognates, when the suffix is not a cognate with orthographic overlap. Discussion of the results will be structured around the two types of morphological knowledge previously defined.

Recognition of Stems in Suffixed Words

The lenient scoring for the translation task gives us a measure of students' ability to recognize familiar stems in suffixed words. The results for the lenient scoring criterion can be best understood by looking at two interactions: the Grade x Cognate Status x Suffixation interaction, and the Morphological Process Type x Suffixation interaction.

The first of these interactions is depicted in Figure 1.

[Insert Figure 1 about here.]

Two significant two-way interactions are apparent in the figure. The Grade x Cognate Status interaction, which indicates that scores for cognates increase more rapidly across grades than scores of noncognates, and the Cognate Status x Suffixation interaction, which reflects the fact that the difference between stems and derivatives is almost non-existent for cognates, but substantial for noncognates.

The three-way interaction appears to consist in the fact that the gap between noncognate stems and derivatives decreases in eighth grade. Analyses of variance for individual grade levels also indicate that the Cognate Status x Suffixation interaction is significant at fourth grade, $F(1,94) = 11.6$, $p < .01$, and at eighth grade, $F(1,59) = 7.1$, $p < .01$, but not at sixth grade, $F(1,38) = 2.3$, $p > .1$. This may be because of greater variability in the scores in sixth grade.

Figure 1 shows a marked increase in students' ability to translate cognates between fourth and eighth grade. However, the translation task alone does not tell us to what extent this increase is due to increased awareness of cognate relationships or to increased knowledge of the words in Spanish. The results of the Spanish yes/no vocabulary test show a fairly high level of knowledge of the Spanish cognates of words in the translation task at all grade levels, but there was nevertheless a highly significant increase in reported knowledge of these words across grades.

We therefore performed a multiple regression analysis to determine to what extent students' increased ability to translate cognates was due to different factors. The dependent variable was the number of cognates (including both inflectional and derivational stems and derivatives) translated correctly, according to the lenient scoring criterion.

We first entered into the regression students' score for noncognates in the translation task (also using lenient scoring). Using this variable as a covariate controls for variation associated with students' ease with the task itself, and to some extent for differences in English and Spanish vocabulary knowledge. We next entered the proportion of Spanish cognates reported as known on the yes/no Spanish

vocabulary test. This variable controls for differences in knowledge of the specific Spanish equivalents of the cognates in the translation task.

Next we entered variables derived from the background questionnaire, reflecting different aspects of the students' experiences and preferences in the use of Spanish and English. Finally, we entered grade. A summary of the final regression model, including only significant variables, is found in Table 7.

[Insert Table 7 about here.]

Results of this analysis show that reported knowledge of Spanish cognates accounted for a substantial proportion of the variance in performance on the translation task, even after performance on the noncognate words in the translation task has been entered. Whether a student was born in or outside of the U.S. also was significant; students born outside of the U.S. were better at translating cognates. Likewise, students who preferred to speak with their teachers in Spanish were better at translating cognates. Finally, grade level was significantly related to the ability to translate cognates even after these other variables had been entered.

Because the effect of grade level is significant even after these other factors have been taken into account, it can plausibly be interpreted as reflecting a developmental trend, above and beyond any differences in the background of the students at the different grade levels. In addition, because students' knowledge of Spanish vocabulary has been statistically controlled for, the increase in ability to translate the English cognates of the Spanish words appears to represent an increase in students' awareness of cognate relationships between Spanish and English.

Another important finding for the lenient scoring criterion was the Morphological Process Type x Suffixation interaction. As can be seen in Figure 2, the gap between stems and suffixed forms was greater for derivatives than for inflections. As would be expected, derivational morphology is more of an obstacle to second language readers than is inflectional morphology.

[Insert Figure 2 about here.]

This figure also illustrates the Cognate Status Type x Suffixation interaction. That is, the gap between stems and suffixed forms is greater for noncognates than for cognates. For cognates, there was little difference between stems and their suffixed forms, as far as the likelihood of a students' recognizing the stem meaning was concerned. That is, a student was equally likely to give a correct translation (by the lenient method of scoring) for *tranquil* or *tranquility*. On the other hand, the students were substantially more likely to translate *cute* correctly than *cuteness*.

Recognition of Systematic Relationships Between Spanish and English Suffixes

As we have seen, even in fourth grade, students could usually identify a stem in a morphologically complex word, if they knew the stem. However, our results also indicate that a second level of morphological knowledge--recognizing the relationship between English derivational suffixes and their equivalents in Spanish--is present only to a limited extent in fourth grade, and develops substantially between fourth and eighth grades.

This can be seen by comparing the strict and lenient criteria scores for suffixed words (see Table 3). For the lenient criterion, scores for stems and suffixed words (at least for cognates) are almost identical. On the other hand, for the strict criterion, scores for suffixed words are substantially below the scores for the corresponding stems. That is, students may be quick to see that the English word *tranquility* has something to do with the Spanish *tranquilo*, but they are much less likely to specify that *tranquilidad*,

rather than *tranquilo*, is the best translation of *tranquility*. This is despite the fact that they report knowing the Spanish words *tranquilo* and *tranquilidad* at about the same rate.

Results for the Suffix Syntax scoring criterion give the same picture. Figure 3 illustrates the Morphological Process Type x Grade interaction. As can be seen in the figure, students' ability to represent inflectional morphology in their translations remains more or less constant across grades, whereas their ability to represent derivational suffixes increases substantially.

[Insert Figure 3 about here.]

Results from the matching task confirm this picture: Students' ability to match English derivational suffixed words with the appropriately suffixed Spanish translation is low in fourth grade, but increases substantially with grade.

Conclusion

Our results show a marked developmental trend in Latino bilingual students' ability to recognize cognates, and in their knowledge of the relationships between English and Spanish derivational suffixes. We would like to emphasize four main points.

First, there is an extremely rapid increase in recognition of cognates compared to noncognates between fourth and eighth grades. We do not attribute this to growth in English vocabulary since these were low frequency English words. Using the Spanish yes/no vocabulary test to control for knowledge of Spanish vocabulary, the trend is still present, suggesting real growth in these Latino bilinguals' ability to recognize cognate relationships.

Secondly, the students did better at recognizing cognate stems in suffixed words than noncognate stems in suffixed words. For the lenient scoring criterion, the gap between cognate stems and derivatives is minimal, whereas the gap between noncognate stems and derivatives is substantial. That is, students are quicker to see the *amicable* in *amicably* than they are to see the *short* in *shortly*, apparently because *amicable* is a cognate. Why this is the case is not totally clear. It may be that these Latino bilingual students are initially learning morphological analysis primarily through cognates--that is, they first see Spanish roots in English suffixed words, and only later recognize non-Latinate roots in English suffixed words. What is clear is that these students develop the first type of morphological knowledge--the ability to see familiar stems in derivatives--before they have made very much progress on the second type of morphological knowledge, knowing the syntactic contribution that cognate suffixes make to suffixed words. This is consistent with the development of these two types of morphological knowledge in monolingual English speakers (Tyler & Nagy, 1989).

Thirdly, students perform better on inflected items than on derived items, though the differences decrease with age. This finding is consistent with the results of research on monolingual speakers of English, who acquire inflectional morphology before most derivational suffixes, and who are still developing knowledge of derivational suffixes between fourth and eighth grade (Nagy, Diakidoy, & Anderson, 1991; Tyler & Nagy, 1989).

Finally, we would like to point out that students' knowledge of English suffixes and their relationships to Spanish suffixes is very low in fourth grade. Although this knowledge increases dramatically from fourth to eighth grade, it is still relatively low even in eighth grade. Because the translation and matching task give similar results, we do not believe this low performance is due to the particular task. Students simply do not see all the possible cognate relationships in suffixes.

The results of this study provide us with a better understanding of the strategies that Latino bilingual students use with English vocabulary, and how these strategies develop. Our results are consistent with the belief that these students can capitalize on their first-language knowledge when reading English, and in particular, that instruction on relationships between Spanish and English derivational morphology may be helpful, especially at higher grade levels. However, more research is certainly needed before any pedagogical application of these findings could be attempted.

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Author Notes

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Table 1

Information about Subjects' Background

	Grade 4	6	8	Total
Birthplace:				
US Mainland	61 (68%)	13 (33%)	18 (31%)	92 (49%)
Elsewhere	29 (32%)	26 (67%)	40 (69%)	95 (51%)
Gender:				
Male	49 (53%)	18 (44%)	29 (47%)	96 (49%)
Female	44 (47%)	23 (56%)	33 (53%)	100 (51%)
Can you read better in Spanish or English?				
Spanish	24 (25%)	18 (44%)	34 (55%)	76 (39%)
English	15 (16%)	1 (2%)	3 (5%)	19 (10%)
Same in both	54 (56%)	22 (54%)	25 (40%)	101 (52%)
Do you prefer to speak Spanish or English with your teacher?				
Spanish	21 (24%)	15 (39%)	34 (60%)	70 (38%)
English	67 (76%)	23 (61%)	23 (40%)	113 (62%)
Do you prefer to speak Spanish or English with your parents?				
Spanish	67 (77%)	29 (74%)	51 (89%)	147 (80%)
English	20 (23%)	10 (26%)	6 (11%)	36 (20%)

Note: Not every student responded to every question; percentages in parentheses are based on those students responding to the question.

Table 2

Target Words from the Translation Task

	Stem	Suffixed form
Cognates		
Derivational suffixation	amicable	amicably
	amorous	amorously
	breve	brevity
	debile	debility
	facile	facility
	obscure	obscurity
	tranquil	tranquility
Inflectional suffixation	celebrate	celebrating
	comport	comporting
	converse	conversed
	explicate	explicated
	initiate	initiating
	inundate	inundated
	masticate	masticating
	negate	negating
	oblige	obliged
	respire	respired
Noncognates		
Derivational suffixation	jelly	jellify
	pretty	prettify
	short	shortly
	month	monthly
	steady	steadily
	cute	cuteness
	dangerous	dangerously
	frost	frosty

Table 2 (Continued)

	Stem	Suffixed form
Inflectional suffixation	allow	allowed
	dream	dreaming
	gather	gathered
	grin	grinning
	melt	melted
	splash	splashing
	spray	spraying
	steam	steamed
General Vocabulary (Filler) Items		
	sour	
	tiger	
	hot	
	help	
	bread	
		rabbits
		leaves

Table 3

Proportion Correct in Translation Task - Lenient Scoring

	Grade 4	Grade 6	Grade 8	Overall
Derivational Suffixation Items				
Cognate Stems	.26 (.26)	.55 (.36)	.72 (.25)	.47 (.35)
Cognate Derivatives	.23 (.28)	.56 (.31)	.70 (.29)	.44 (.36)
Noncognate Stems	.49 (.28)	.49 (.34)	.59 (.28)	.52 (.29)
Noncognate Derivatives	.20 (.21)	.22 (.29)	.43 (.30)	.27 (.27)
Inflectional Suffixation Items				
Cognate Stems	.37 (.26)	.59 (.31)	.79 (.23)	.55 (.32)
Inflected Cognates	.36 (.26)	.65 (.27)	.77 (.23)	.55 (.31)
Noncognate Stems	.26 (.21)	.27 (.28)	.39 (.29)	.30 (.26)
Inflected Noncognates	.23 (.20)	.21 (.21)	.35 (.30)	.26 (.24)

Note: Standard deviations are in parentheses.

Table 4

Proportion correct in Translation Task - Strict Scoring

	Grade 4	Grade 6	Grade 8	Overall
Derivational Suffixation Items				
Cognate Stems	.22 (.23)	.50 (.33)	.65 (.26)	.41 (.33)
Cognate Derivatives	.07 (.16)	.19 (.23)	.33 (.29)	.18 (.25)
Noncogate Stems	.42 (.26)	.44 (.32)	.49 (.26)	.45 (.27)
Noncognate Derivatives	.05 (.10)	.09 (.21)	.20 (.22)	.10 (.18)
Inflectional Suffixation Items				
Cognate Stems	.24 (.23)	.42 (.30)	.53 (.31)	.37 (.30)
Inflected Cognates	.13 (.16)	.21 (.26)	.34 (.29)	.21 (.25)
Noncognate Stems	.18 (.18)	.18 (.23)	.25 (.26)	.20 (.22)
Inflected Noncognates	.16 (.18)	.14 (.19)	.22 (.24)	.17 (.21)

Note: Standard deviations are in parentheses.

Table 5

Translation Task Proportion Correct - Suffix Syntax

	Grade 4	Grade 6	Grade 8	Overall
Derivational Suffixation Items				
Cognate Derivatives	.27 (.37)	.29 (.33)	.45 (.33)	.34 (.36)
Noncognate Derivatives	.20 (.31)	.28 (.35)	.41 (.33)	.29 (.34)
Inflectional Suffixation Items				
Inflected Cognates	.34 (.33)	.30 (.36)	.45 (.32)	.37 (.34)
Inflected Noncognates	.55 (.38)	.51 (.43)	.55 (.38)	.54 (.39)

Note: Standard deviations are in parentheses.

Table 6

Proportion Reported Known in Yes/No Spanish Vocabulary Test

	Grade 4	Grade 6	Grade 8	Overall
Derivational Suffixation Items				
Cognate Stems	.79 (.18)	.91 (.14)	.96 (.11)	.87 (.18)
Cognate Derivatives	.73 (.19)	.86 (.15)	.90 (.12)	.81 (.18)
Inflectional Suffixation Items				
Cognate Stems	.81 (.15)	.93 (.08)	.95 (.10)	.88 (.14)
Inflected Cognates	.80 (.16)	.86 (.17)	.94 (.08)	.85 (.16)

Note: Standard deviations are in parentheses.

Table 7

Multiple Regression Analysis on Translation of Cognates (Proportion Correct, Lenient Scoring)

Variable	Regression Coefficient	R^2	Change in R^2	F to Enter	Correlation
Noncognate Translation	.31	.156	.156	29.9	.40
Yes/No Vocabulary	.67	.536	.380	132.1	.70
Born in the U.S.	.12	.596	.060	23.8	.37
Speak to Teacher	-.03	.618	.022	8.9	-.29
Grade .06	.707	.089	47.9	.66	
Constant	-.62				

Figure Captions

Figure 1. Interaction of Cognate Status x Suffixation x Grade, Translation Task, Lenient Scoring Criterion.

Figure 2. Morphological Process Type x Suffixation Interaction, Translation, Lenient Scoring.

Figure 3. Morphological Process Type x Grade Interaction, Translation Task, Suffix Syntax Score.

Interaction of
Cognate Status x Suffixation x Grade
Translation Task, Lenient Scoring

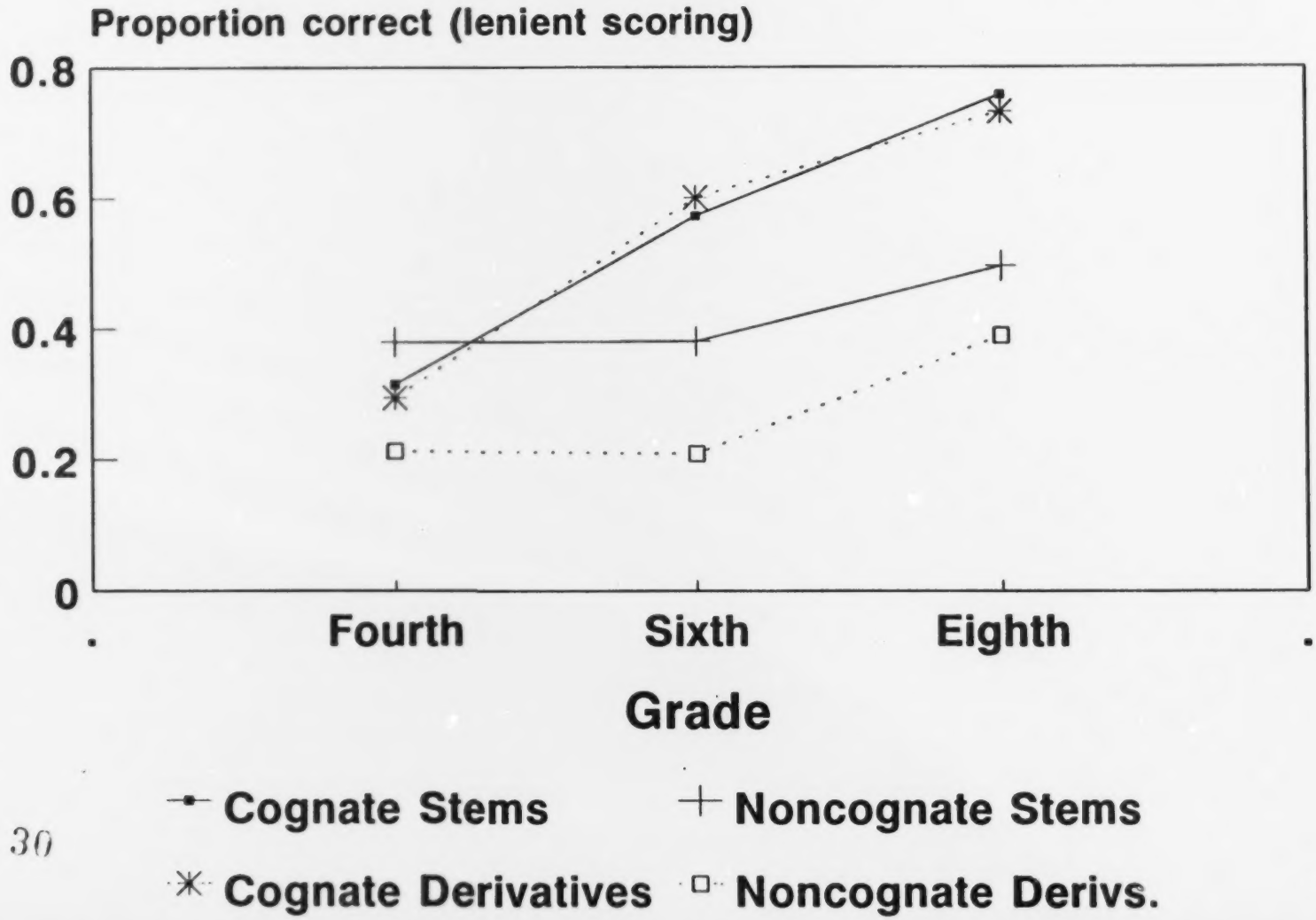

Figure 1

Morphological Process Type x Suffixation Interaction Translation Task, Lenient Scoring

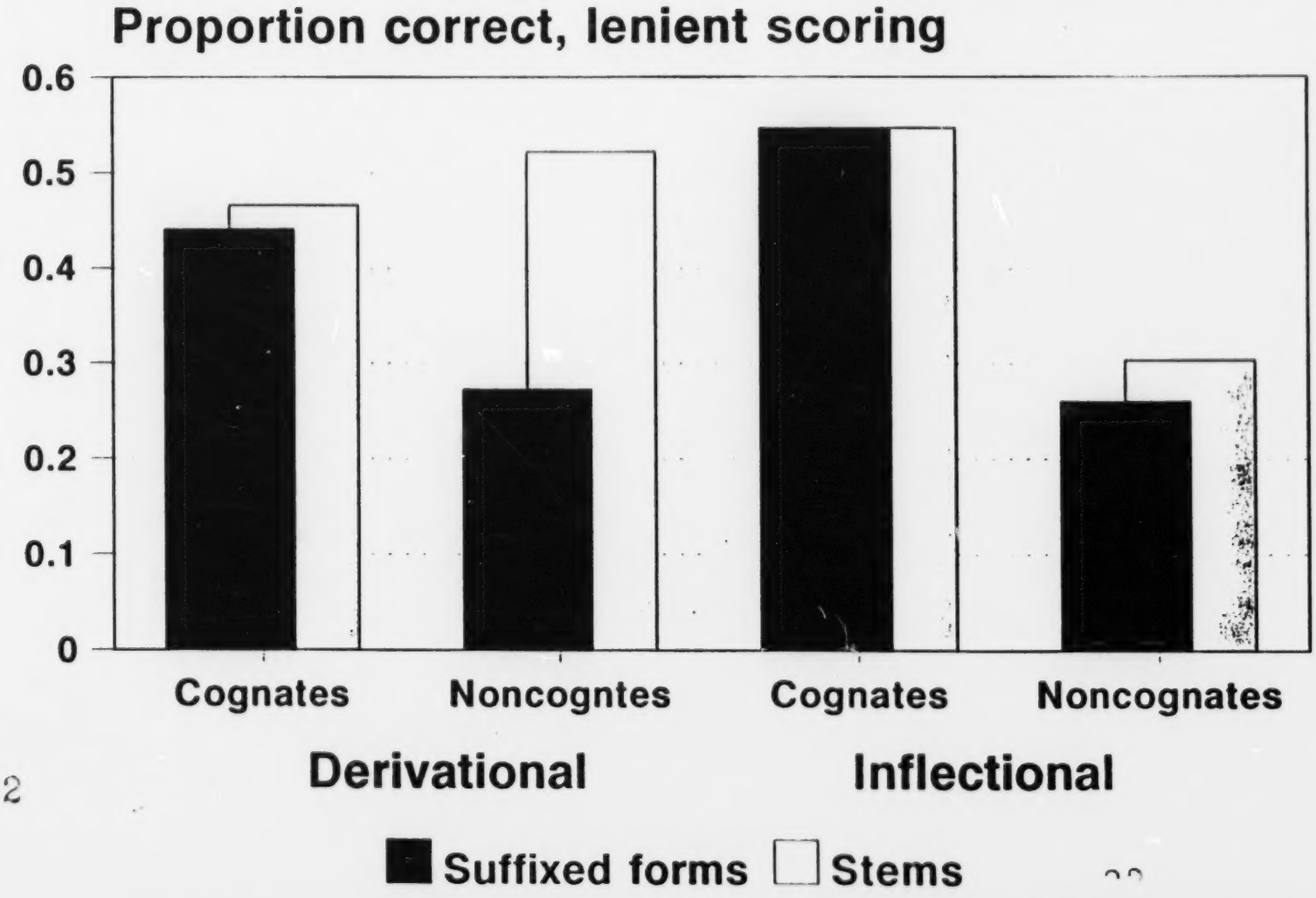

Figure 2

Morphological Process Type x Grade Interaction Translation Task, Suffix Syntax Score

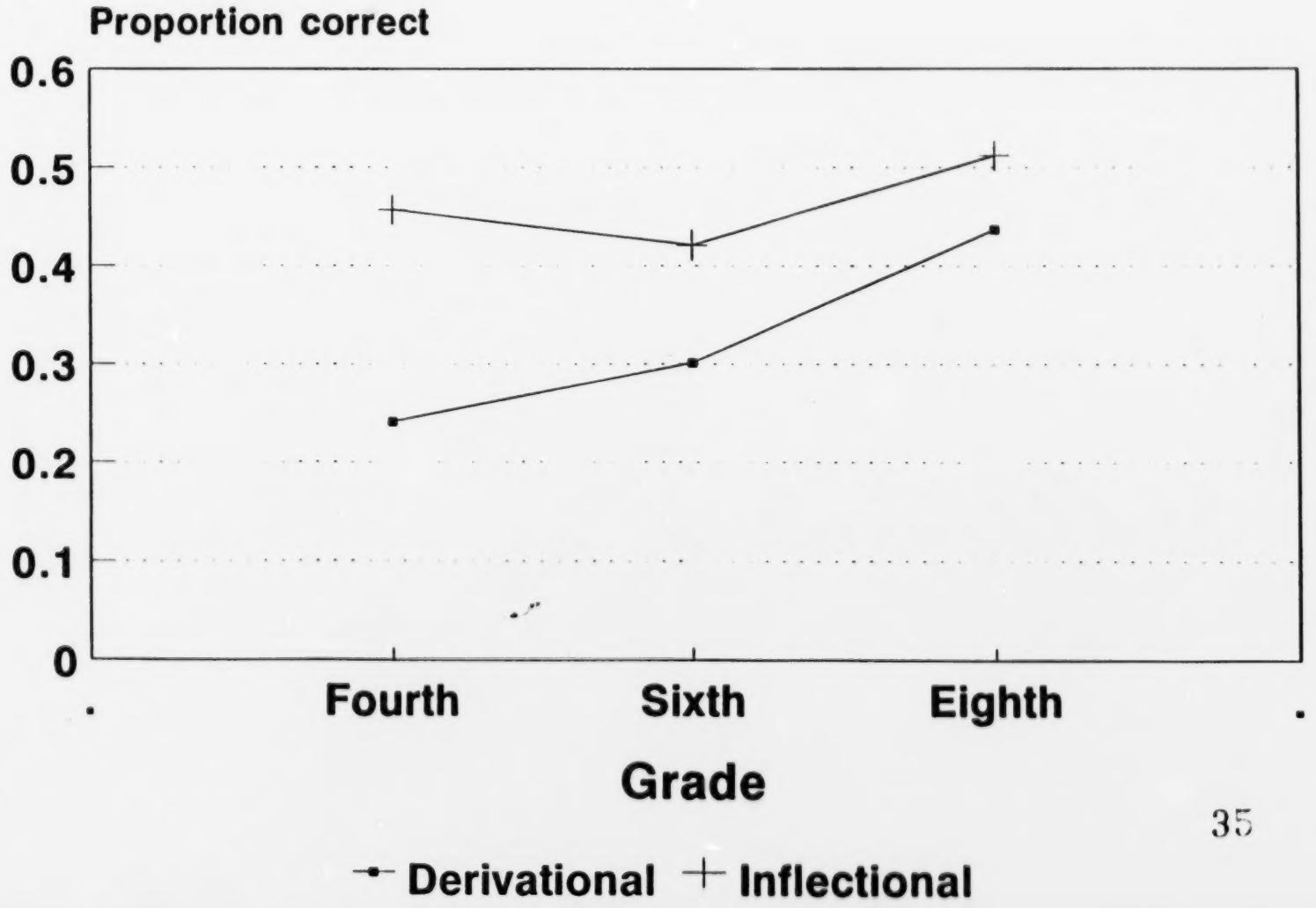

Figure 3

Appendix A

Translation Task

Instructions

We are interested in what English words you know. In this test, you will see some short phrases. In each phrase, one word will be underlined. If you know what the underlined word is in Spanish or think you can guess, write that Spanish word in on the line. Try to use the Spanish word that best expresses how the English word is used in a sentence. For example, in the sentence "I walk to school every day," the best Spanish word for walk would be *camino*.

Some of these words are easy, and some are hard. Do the best you can. We will not give grades for this test, we just want to know if you can give the Spanish words for certain English words.

Let's go over some examples:

1. She found a dog in the room _____
2. John and Mary were singing. _____
3. Marcos passed the cookie to his friend. _____
4. It behooves us to leave _____

Remember, write the Spanish word for the underlined English word.

Appendix A, continued

Translation Task

Sample Items

1. The fruit was sour. _____
2. It was a very hot day. _____
3. He wanted to see a tiger. _____
4. The girls gathered their books. _____
5. He kept three rabbits in his room. _____
6. The new girl at school seemed amicable. _____
7. Sophia went for a short ride. _____
8. The river may inundate our yard. _____
9. The obscurity frightened us. _____
10. There were no leaves on the trees. _____
11. They looked at each other amorously. _____
12. The students like to converse. _____
13. It was a very tranquil day. _____
14. Tom was negating his guilt. _____
15. Carmen received her allowance monthly. _____
16. We should celebrate today. _____

Appendix B

Spanish Yes/No Vocabulary Test

Instructions

Nos gustaría saber cuáles palabras conoces en español y cuáles no.

Vas a ver unas palabras en español. Si conoces el significado de la palabra, pon un círculo alrededor de la SI. Si no la conoces, pon un círculo alrededor de la NO.

Algunas palabras son bastante faciles, pero otras son dificiles. Algunas palabras no son palabras verdaderas, asi que no sabrás el significado. No vamos a dar notas en este ejercicio, sólo queremos saber cuáles palabras conoces y cuáles no.

Vamos a hacer unos ejemplos.

1. perro sí no : 3. memorizar sí no
2. fuli sí no : 4. ocelo sí no

Este estudiante conoce el signifcado de *perro*, pero no conoce el significado de *fuli*. En realidad, *fuli* ni siquiera es una palabra. El estudiante conoce el significado de *memorizar*, pero no conoce el significado de *ocelo*. *Ocelo* es, en realidad, una palabra verdadera. Lo que ocurre es que mucha gente no sabe lo que quiere decir.

No hay palabras mal deletreadas en el texto.

Appendix B, continued

Spanish Yes/No Vocabulary Test

Sample Items

¿Sabes lo que significa esta palabra?

Haz un círculo: sí o no

1.	dulce	sí	no	:	16.	lastimar	sí	no
2.	blandear	sí	no	:	17.	proció	sí	no
3.	atrocamente	sí	no	:	18.	calvez	sí	no
4.	palabra	sí	no	:	19.	escumar	sí	no
5.	brevedad	sí	no	:	20.	sudatoso	sí	no
6.	obligó	sí	no	:	21.	oscuridad	sí	no
7.	iniciando	sí	no	:	22.	pesante	sí	no
8.	comportar	sí	no	:	23.	latrificar	sí	no
9.	hoqueña	sí	no	:	24.	hermano	sí	no
10.	nomidéz	sí	no	:	25.	amoroso	sí	no
11.	rebatiendo	sí	no	:	26.	hiló	sí	no
12.	brese	sí	no	:	27.	respiró	sí	no
13.	humanizar	sí	no	:	28.	triste	sí	no
14.	chirriando	sí	no	:	29.	celebrando	sí	no
15.	tranquilo	sí	no	:	30.	sontente	sí	no

Appendix C

Matching Task

Instructions

We are interested in what you know about English words which are like a certain Spanish word.

In this task, you will see an English word along with four Spanish words which look like and have a similar meaning as the English word. All four are words in Spanish, although you may not have seen some of them before. Consider all four choices, and then circle the Spanish word which is closest to the English word **in meaning**.

Do the best you can. You will not receive a grade for this, we just want to see how much you know about certain English words and Spanish words which are similar.

Let's do some examples.

1. study
   a) estudiante
   b) estudiantil
   c) estudiar
   d) estudiando

2. amorous
   a) amor
   b) amorosa
   c) amorosamente
   d) amante

Appendix C, continued

Matching Task

Sample Items

1. anxious
   a) ansia
   b) ansiar
   c) ansiedad
   d) ansioso

2. celebrate
   a) celebrar
   b) celebración
   c) celebrador
   d) celebrante

3. opinion
   a) opinión
   b) opinable
   c) opinar
   d) opinante

4. purify
   a) purificación
   b) puridad
   c) purificar
   d) purificativo

5. religion
   a) religionario
   b) religión
   c) religioso
   d) religiosidad

6. pianist
   a) pianista
   b) pianoforte
   c) piano
   d) pianola